

CONF-781105--63

LA-UR-78-2651

TITLE: REMOVABLE HOT CELL LINERS

AUTHOR(S): Francis J. Fitzgibbon.
David S. Shaffer
James M. Ledbetter
Warren T. Wood

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SUBMITTED TO: American Nuclear Society
For presentation at the 1978 Winter Meeting of the American Nuclear Society, Washington, DC, November 12-17, 1978, and publication in the Transactions of the American Nuclear Society.

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REMOVABLE HOT CELL LINERS

F. J. Fitzgibbon, D. S. Shaffer, J. M. Ledbetter,
and W. T. Wood

Los Alamos Scientific Laboratory
Los Alamos, NM 87545

REMOVABLE HOT CELL LINERS

ABSTRACT

In 1959 the Los Alamos Scientific Laboratory (LASL) proposed design requirements for an alpha-gamma box system¹. Among the requirements was a provision for conveniently removing a contaminated cell liner (alpha-gamma box) from an operating cell. Various situations, such as a change in program direction, outmoded equipment, or an unexpected development, could result in a decision to replace a cell liner (Fig. 1) and reuse the cell for another purpose. The contaminated cell liners could either be stored temporarily for possible future use or disposed of at the LASL contaminated Waste Disposal Area.

This report describes LASL's experience removing used hot cell liners from operating cells.

INTRODUCTION

Eight of the sixteen cells at the Los Alamos Wing 9 Hot Cell Facility² are equipped to handle irradiated alpha emitters (plutonium). A cell liner is placed in each of the eight cells used for various destructive examinations of irradiated fast reactor fuel pin assemblies.

Since 1963 nine active liners have been removed from their cells; six were disposed of and three were temporarily stored. Three of the disposed liners were obsolete because of program completion and three were replaced with units having improved design features. Because the remaining liners had more general capabilities (remote lathe, spark chamber for an emission spectrograph, and testing machines), they were stored for possible future use.

Operations conducted within the liners consist of nondestructive and destructive examinations of irradiated fuel pins, composed of mixed uranium-plutonium oxides and carbides. The presence of these materials and the results of some of the required examinations produce a high beta-gamma and alpha contamination background level within the liner. Under normal conditions, the exterior of the liner is contamination-free; however, the beta-gamma background level outside the liner varies depending on the type of examination being made inside the liner. Several types of remote transfer systems allow materials and equipment to be inserted into the liners without causing any loss of inert atmosphere or contamination release.

A liner to be disposed of is first emptied of tools and removable equipment, then washed repeatedly to reduce beta-gamma levels. Dust resulting from sectioning operations is especially difficult to remove and is thus the most time consuming operation. Services to the liner exterior are severed and loose equipment is removed. Large liner pieces that cannot be removed are either secured with tie-downs or are welded together or to the liner to

prevent damage to the viewing windows and also to avoid a breach of the liner when the 1135-kg (2500-lb) unit is moved from its vertical position to a horizontal position during removal and disposal operations.

Removal of the cell roof slab allows vertical movement of the 1.68-m by 1.68-m by 3.35-m high liner. After the roof slab is removed, a 20-mil PVC shroud (1.80-m by 1.80-m by 4.18-m-long) is lowered onto and around the liner. The shroud is suspended on a spider, which is attached to an overhead crane and used to pick up the liner. While the shrouded liner is being raised from the cell, a PVC sheet is spread over the shroud for additional contamination control. The shrouded liner is placed in a partially assembled wooden crate (Fig. 2) made of 3/4 in. plywood, 2 by 4's, and steel angles. After the remaining side and top are attached to the crate (Fig. 3), it is taken to the LASL contaminated Waste Disposal Area.

The most contaminated cell liner was removed in December 1977. Approximately 300 uranium-plutonium oxide and carbide irradiated fuel pins had been sectioned in the liner. A total exposure of 9.9 rem was received by 15 employees during the period of decontamination and removal operations. A new liner was installed into the clean cell in 1-week after the contaminated liner was removed.

We believe that the original design requirements have been satisfied. The 1135-kg (2500-lb) cell liners can be conveniently removed from their cells with an economical expenditure of personnel exposure and time.

REFERENCES

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2. J. R. Lilienthal, "Los Alamos Alpha-Gamma Cells," Proc. of the 7th Conf. on Hot Laboratories and Equipment, pp. 292 - 304, April 7 - 9, 1959.

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Fig. 1. Cell liner

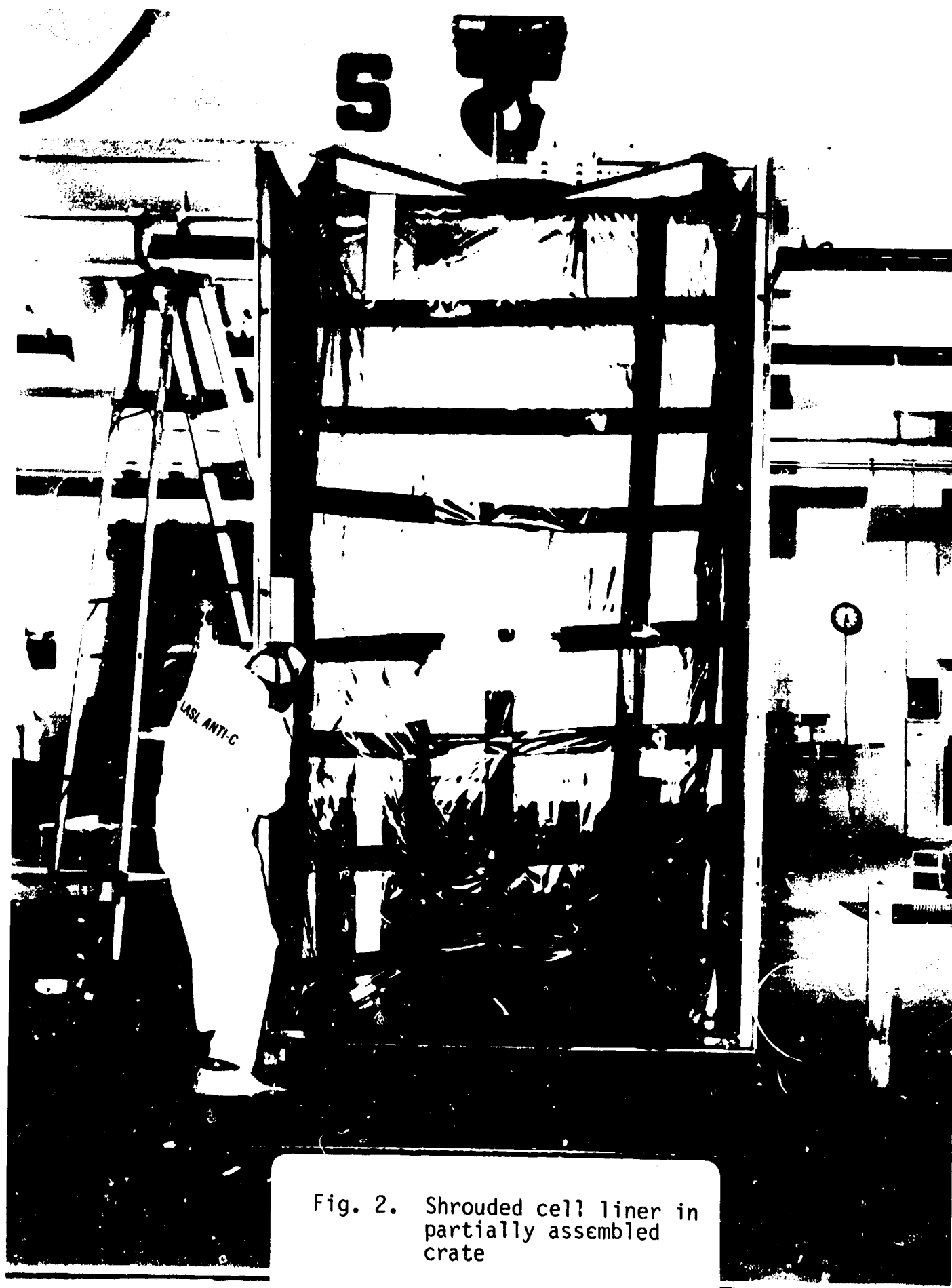


Fig. 2. Shrouded cell liner in partially assembled crate



Fig. 3. Crate containing cell
liner ready for disposal